

# PATENT SPECIFICATION

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## COMPLETE SPECIFICATION

### DRAWINGS ATTACHED

#### Improvements in and relating to Non-Return Valves

We, SOCIÉTÉ DES CLAPETS T.J., a Société Anonyme incorporated under the laws of France, of 1, rue Paul Sabatier, Chalon-sur-Saône (Saône-et-Loire), France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The invention relates to non-return valves consisting of a valve member which normally rests on a seating within a casing, with or without the assistance of a spring, so as to prevent flow of fluid through the casing in one direction, the valve member being moved from its seating by exertion of a preponderating degree of pressure on its underside, so as then to allow the fluid to flow through the casing in the opposite direction.

Check valves and foot valves are instances of valves required to have these characteristics, although there are others and the function of many such non-return valves is determined by giving the valve member the form of a ball which returns to its seating as soon as the flow of fluid which moves it from its seating, is interrupted or falls to a predetermined low pressure at the underside of the valve.

This has a number of disadvantages. For one thing, due to repeated movements of the ball to and from its seating, there is a tendency for the ball and seating to become irregularly worn, thereby reducing, more or less quickly, the sealing effect of the valve when the ball is in its seated position. This irregular wear can be attributed to the fact that the fluid flowing through the valve casing causes the ball to rotate so that it returns to its seating in different surface positions.

For another thing, the ball when borne

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by the flowing fluid cannot maintain a truly central position owing to the annular clearance that has to be provided to allow for the flow. As a result, the ball returns to its seating from different angles, thus tending to impose irregular wear on the seating, and on the ball itself. Then again, the use of a ball necessitates the provision within the casing of arresting means to limit the amount by which the ball can move from its seating and such means have a throttling effect on the flow of fluid when the valve is open.

The object of the present invention, in general, is to provide a non-return valve which, while having substantially the same characteristics as regards simplicity as a non-return valve member consisting of a ball, has none of its disadvantages.

Accordingly there is provided a non-return valve comprising a casing formed with a guideway neck portion therein and a conical seating at an end of said neck and a substantially ovoid valve member being movably mounted in the casing, part of the said member being sealingly engageable with the said seating to act as a closure against liquid flow in one direction through the valve casing, and able to project into the guideway neck, the said part having a series of protruding fingers adapted to co-operate with the said neck and thus to cause the valve member to travel in a straight or substantially straight line during its opening and closing movements with respect to the sealing.

Preferably, the fingers are flexible strips. In order that the invention may be better understood, it will now be described with reference to the accompanying drawings, which are given by way of example only and in which:—

Fig. 1 is a vertical sectional view of the

complete valve,

Fig. 2 is an inverted plan view corresponding to Fig. 1, but with one of the parts omitted for convenience of illustration, and

Fig. 3 is a vertical sectional view of the valve member but showing the addition of a core or insert.

As shown in Figs. 1 and 2, the valve comprises a tubular casing 1 which will usually be made of metal. At its ends, the casing 1 is formed with internal screw threads 2 surrounded by nut portions 3 enabling the casing to be joined to the screw-threaded ends of inflow and outflow pipes (not shown), the direction of flow being indicated by the arrow F in Fig. 1.

Between its ends, the casing 1 is formed with a throat or neck 4 (Fig. 1) the internal cylindrical surface of which constitutes a guideway 5. The upper end of the guideway 5 merges into a conical seating 6 (Fig. 1), while the lower end of the guideway terminates in a surrounding annular shoulder 7.

In combination with the casing 1 when constructed as just described, there is provided a valve member generally indicated at 8.

The valve member 8 has a shape approximating to that of an egg, and a sealing ring 11 is shown in an annular groove 10 around the lower part of the head portion 9 thereof. 12 are depending fingers, the number of which may vary, and these fingers are equi-angularly spaced around the vertical axis of the valve member 8, from the lower part of which they depend.

The fingers 12 are strip like in form and flexible and pass through the guideway 5; their outer edges are vertical and are in sliding engagement with the guideway 5, so that, in conjunction with the latter they act to guide the valve member 8 in a straight vertical line during upward and downward movements. The lower extremities of the fingers are formed with claws 13 so that they can act as stops to contact the shoulder 7, thus limiting the upward movement of the valve member. These fingers can be quite thin strips so that they present no noticeable obstruction to the flow of fluid, but their sliding engagement with the wall of the guideway will serve to restrain the valve member against rotation about its vertical axis.

The particular partial egg shape of the portion of the member 8 which is below the valve head 9 will cause the fluid to move as an annular jet outwardly at an angle towards the wall of the upper part of the casing 1 and thus to sweep over the seating 6 without causing erosion but keeping this seating free of particles of dirt and maintain it always in a clean condition.

While not essential to the practical application of the invention in all its forms, the

embodiment illustrated includes a spiral compression spring 15 (Fig. 1) arranged between the shoulder 7 and the upper edges of the claws 13 on the fingers 12, the spring acting normally to maintain the valve member 8 in closed position. For convenience of illustration, the spring is not shown in Fig. 2.

The spring 15, when provided, ensures that the valve member 8 will not have to depend solely on the effect of gravity or back-pressure to cause it to return to closed position when the pressure acting to open it ceases or falls sufficiently. The spring 15 thus ensures that the valve will function correctly irrespective of the position in which it is placed as a whole, that is to say, irrespective of whether it is placed vertically as shown, or horizontally, or at an upwardly or downwardly inclined angle, less than a right angle to the vertical, or is completely inverted.

A number of materials come into consideration for use in the manufacture of the valve member 8 and the sealing ring 11, the choice of materials depending on conditions and requirements. Among such materials may be mentioned certain kinds of synthetic resins which, as regards the valve head 9 and fingers 12, give these parts sufficient inherent rigidity while leaving the fingers with the requisite degree of flexibility.

The valve member and fingers 12 may be moulded or otherwise formed in one piece.

In the embodiment of a valve member shown in Fig. 3 for use in a valve according to the invention, the interior of the valve member has an insert or core 16. This core may be of various materials, such as a plastic or other light material, or a heavy metal such as lead.

The core 16, moreover, has the advantage of allowing for the production of a valve member which can be moulded free from shrinkage.

When the invention is embodied as a foot-valve, the part of the casing lying below the shoulder 7 will usually be omitted, this part then being replaced by a perforated strainer or the like suitably secured by its upper end around the neck or throat 4.

The valve member is designed to be used in various apparatus other than check-valves, but always requires a guideway to keep it in a virtually straight line and to limit its upward movement.

#### WHAT WE CLAIM IS:—

1. A non-return valve comprising a casing formed with a guideway neck portion therein and a conical seating at an end of said neck and a substantially ovoid valve member being movably mounted in the casing, part of the said member being sealingly engageable with the said seating to act

- as a closure against liquid flow in one direction through the valve casing, and able to project into the guideway neck, the said part having a series of protruding fingers adapted to co-operate with the said neck and thus to cause the valve member to travel in a straight or substantially straight line during its opening and closing movements with respect to the sealing.
2. A valve as claimed in claim 1 in which the fingers are flexible strips.
3. A valve as claimed in claim 2, in which the flexible strip fingers are adapted to pass through the guideway neck of the valve casing, with their outer edges in sliding engagement with said guideway.
4. A valve as claimed in either of claims 2, 3 or 4 in which the outer edges of the flexible strip fingers in sliding engagement with the guideway, are vertical edges.
5. A valve as claimed in any of claims 2, 3 or 4 in which the distal extremities of the flexible strip fingers have laterally projecting claws adapted, when the valve is in the fully opened position, to abut a shoulder in the valve casing.
6. A valve as claimed in claim 5 in which the distal extremities of the fingers normally lie at a distance below the guideway, the laterally projecting claws lying in vertical alignment with the shoulder surrounding the lower end of the guideway, which is abutted by the projecting claws when the valve member is in the fully-open position.
7. A valve as claimed in any of claims 1 to 6 in which the valve member is moulded over a core, or has an insert which is of a density similar to or different from the density of the other parts constituting the valve member, so that the effective density of the valve member can be made greater or less than, or similar to the density of the fluid in which the valve member has to work, or so that the effective density can be chosen according to the position, horizontal, vertical or inclined at an angle less than a right angle to the vertical, in which the valve will be used.
8. A valve as claimed in any previous claim in which a sealing strip is provided between the valve member and the seating.
9. A valve as claimed in claim 8 wherein the sealing strip is attached to the valve member.
10. A non-return valve substantially as hereinbefore described and illustrated in Figs. 1 and 2, or 3 of the accompanying drawings.
11. An ovoid valve member with guide fingers extending therefrom.
12. A valve member substantially as hereinbefore described with reference to Figs. 1 and 2, or 3 of the accompanying drawings.

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1 SHEET

COMPLETE SPECIFICATION

This drawing is a reproduction of  
the Original on a reduced scale.

